

**REMARKS**

The Examiner's action and the reference relied upon therein have been carefully considered and the application has been amended accordingly. Specifically, Figure 3 of the drawings has been amended to include reference numeral 20 and a lead line to indicate the "gap" of page 4, line 15. No new matter has been added by this amendment. A replacement sheet containing Figure 3 is submitted herewith. The Examiner's approval thereof is respectfully requested. In addition, the specification has been amended to change "platelet(s)" to "plate(s)" and "plastics" to "plastic", to insert the new reference numeral 20 and to make other minor editorial changes, and a substitute specification containing these amendments is submitted herewith. Also submitted is a marked up version of the substitute specification showing all changes. The substitute specification includes no new matter. Further, the title has been amended to be indicative of the invention to which the claims are directed.

Claims 1-19 stand rejected under 35 USC 112, second paragraph, as being indefinite. Claims 1, 13, 16 and 17 have been cancelled, claims 2-6, 8-12, 14-15 and 18-19 have been rewritten and new claims 20-37 have been added. It is respectfully submitted that the rewritten and new claims have taken account of the Examiner's objections to the original claims. It is now believed that rewritten claims 2-6, 8-12, 14-15 and 18-19 and new claims 20-37 conform to the requirements of 35 USC 112, second paragraph.

New claims 20-37 generally conform to the original claims 1-19 as follows. New claim 20 is based on original claim 1 and contains the additional features shown in Figures 1, 4 and 5 of the drawings according to which a circumferential rim projects from the second face of the plate which is opposite to the first face of the plate from which the brush bristles project and a gap is formed between the attachment surface portion of the brush body and the second face of the plate. New claims 21 to 31 are based on original claims 2 to 12. New claims 32 to 35 are based on original claims 14, 16, 18 and 19, respectively. New independent claim 17 is based on original claims 13 and 17 and further contains the additional features of new claim 20. New claim 37 corresponds to original claim 15.

New independent claims 20 and 36 define a method of producing a brush comprising the

steps of providing a brush body of a plastic material which has an attachment surface portion, providing a plate of a plastic material which has tufts of brush bristles attached thereto and projecting from a first face, and connecting the plate to the attachment surface portion of the brush body by either ultrasonic welding or gluing. Opposite to this first face from which the brush bristles project, the plate has a second face from which a peripheral rim projects which defines an edge. The plate contacts the attachment surface portion along the edge defined by the peripheral rim so that a gap is formed between the attachment surface portion of the brush body and the second face of the plate. These features are clearly shown in Figures 1 and 4 of the drawings.

Claims 1, 3, 10 13, 16-17 and 19 stand rejected under 35 USC 102(b) as being anticipated by Rueb (797), the Examiner stating that Rueb discloses brush bodies formed of a plastic material having an attachment surface portion, plats of plastic materials having tufts of bristles attached thereto, connecting the plate to the brush body using ultrasonic welding, the plate having a peripheral rim on a face opposite to that where the bristles project, a pressing means, means for applying an adhesive, the brush bodies having a recess into which the plate is inserted and the plate and brush bodies being made of the same plastic material. However, Rueb fails to disclose a circumferential rim projecting from the second face for forming a gap between the attachment surface portion and the second face, as appears in all of the new claims. As can be seen in Figure 8 of Rueb, the plate 114 does not have a circumferential rim projecting from its second face, as is required in each of new claims 20-37. In its assembled state, plate 114 contacts the attachment surface portion with the overall area of its second face and not only along an edge which is defined by a peripheral rim projecting from the second face. As a result no gap is formed between the attachment surface portion and the second face of the plate in Rueb. For this reason, with respect to new claims 20-37, this ground of rejection is respectfully traversed.

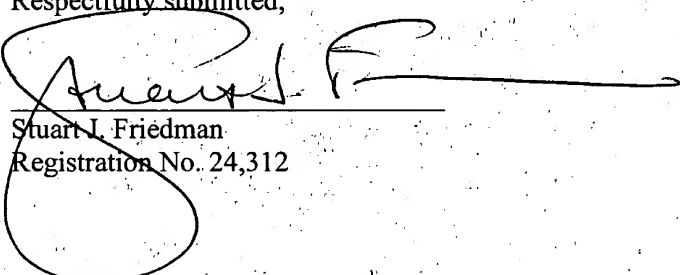
The expression "energy concentrator" appearing in the claims is described in the specification in the paragraph bridging pages 1 and 2 and in paragraph 2, page 2. As used, the term means that the ultrasonic energy during ultrasonic welding is concentrated at the edge of the peripheral rim so that the weld joint is produced at this edge. The feature of the "energy

concentrator" has the effect that in mass production of toothbrushes, for example, the plates can be precisely attached to the brush bodies.

Applicant gratefully acknowledges the indication that original claims 2, 4-9, 11-12, 14-15 and 18 would be allowable if rewritten in independent form. Accordingly, claims 2 and 14 have been rewritten in independent form. Claims 3-6, 8-12 and 18-19 have been amended to depend, directly or indirectly, from independent claim 2. Likewise, claim 15 has been amended to depend from independent claim 14. Accordingly, claims 2-12, 14-15 and 18-19 are now allowable.

With respect to new claims 20-37, at least one essential limitation of each new claim is not met by the cited Rueb reference. Accordingly, the rejection of these claims under 35 USC 102(b) as fully anticipated by Rueb would be inappropriate. It is, therefore, respectfully submitted that new claims 20-37 are also in condition for allowance. Accordingly, an early Notice of Allowance directed to claims 2-12, 14-15, 18-19 and 20-37 is courteously solicited.

Respectfully submitted,



Stuart I. Friedman  
Registration No. 24,312

NIXON PEABODY LLP  
8180 Greensboro Drive, Suite 800  
McLean, VA 22102  
Telephone: (703) 770-9300  
Facsimile: (703) 770-9400

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Method of  
Producing Brushes a Brush Having a Bristle Plate

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Field of Invention

[0001] The invention relates to a method of producing brushes by connecting plateletsplates of a plasticsplastic material, having each tufts of brush bristles attached thereto and projecting from a first face, to an attachment surface portion of a brush body made of plasticsplastic, in particular the same plasticsplastic, by means of ultrasonic welding or glueinggluing.

Background of the Invention

[0002] It is known in brush making to attach tufts of bristles to carrier plateletsplates which are then attached to a brush body. The attachment of the carrier plateletsplates to the brush bodies can be done by welding, in particular when the carrier plateletsplates and the brush bodies are made of the same plastic material. At the junction between the carrier plateletplate and the surface of the brush body a gap may be produced which is undesirable both for reasons of aesthetics and also for reasons of hygiene.

Brief Summary of the Invention

[0003] The invention provides a method of reliably connecting the carrier plateletplate to the brush body without an undesirably large gap remaining between the carrier plateletplate and the brush body.

[0004] In accordance with a first aspect of the invention, the plastic materials of the plateletplate and the brush body are connected by ultrasonic welding. Formed on the peripheral rim of the plateletplate is an edge facing the brush body and acting as an energy concentrator in ultrasonic welding. Welding is therefore effected with high precision, so that also in mass production such as in the case of toothbrushes, for example, the plateletplate is attached to the brush body with a precise fit. The edge preferably tapers toward the brush body. In an advantageous embodiment of the method the brush body is provided with a recess into which the plateletplate can be inserted with a precise fit. The gap remaining

between the outer edge of the ~~plateletplate~~ and the rim of the recess will then be very small and barely perceptible.

[0005] In this embodiment of the method, the edge engages the bottom of the recess by its tapered end, so that the weld joint is produced at the bottom of the recess. The welding process is further assisted by a pressing means which presses the ~~plateletplate~~ against the bottom of the recess of the brush body.

[0006] Preferably, an extension projecting beyond the recess of the brush body is formed at the peripheral rim of the ~~plateletplate~~. This extension may extend over the entire periphery of the ~~plateletplate~~ or only over a part thereof, preferably over that part which extends as far as into the neck piece of the brush body in the case of a toothbrush. Bending loads occur at this point which cause any gap that possibly remains between the ~~plateletplate~~ and the brush body to be opened when the head of the toothbrush is bent back in use. This extension, too, is preferably provided with a tapered edge which faces the brush body and acts as an energy concentrator in ultrasonic welding.

[0007] Any gap that may still be left between the ~~plateletplate~~ and the brush body may be closed by a finishing treatment, in particular by filling it with a suitable ~~plasticsplastic~~ mass. More particularly, the brush body with the ~~plateletplate~~ already fitted therein may be placed in an injection mold which is used to apply a molding over the gap so as to completely fill it and close it.

[0008] In an alternative embodiment of the method according to the invention, the brush body is provided with a recess into which the ~~plateletplate~~ is inserted with a precise fit and attached there by means of an adhesive. Also in this embodiment, any gap possibly left between the ~~plateletplate~~ and the brush body may be closed by molding in an injection mold.

[0009] In a further embodiment of the invention, the ~~plateletsplates~~ are attached to the brush bodies using a combination of ultrasonic welding and glueing. In particular, the load-bearing fastening of the ~~plateletplate~~ may be performed by welding it to the bottom of the recess of the brush body, whereas the adhesive is introduced into the gap remaining between the ~~plateletplate~~ and the brush body and fills the same.

#### Short Descripton of the Drawings

[0010] Further features and advantages of the invention will be apparent from the following description of several embodiments of the method and from the drawings to which

reference is made and in which:

- [0011] Figure 1 is a schematic sectional view of the head portion of a toothbrush which may be manufactured in the method according to the invention;
- [0012] Figure 2 shows a top view of the head portion of the toothbrush;
- [0013] Figure 3 is a schematic sectional view of a toothbrush deformed by bending loads in use;
- [0014] Figure 4 is an enlarged view of a section taken through the head portion of a toothbrush manufactured in accordance with a preferred embodiment of the method;
- [0015] Figure 5 shows a detailed view of the ~~platelet~~plate used in the embodiment of the method illustrated in Figure 4;
- [0016] Figure 6 shows a top view of the head of a toothbrush in accordance with the embodiment of Figure 4; and
- [0017] Figures 7 to 12 show sectional and partial views of toothbrushes which may be manufactured by employing several variants of the invention embodiments of the method.

#### Detailed Description of the Invention

[0018] In the embodiment of the method shown in Figure 1 a recess 12 is formed in the head portion of a toothbrush body 10. A carrier ~~platelet~~plate 14 is fittingly inserted in this recess 12. The carrier ~~platelet~~plate 14 has a number of through holes having tufts 16 of bristles inserted and fastened therein. An edge 18 is formed on the peripheral rim of the carrier ~~platelet~~plate 14 and tapers toward the bottom of the recess 12. The brush body 10 and the ~~platelet~~plate 14 are preferably made of the same ~~plastics~~plastic, such as, e.g., polypropylene.

[0019] An apparatus for making such a toothbrush using the method according to the invention comprises an ultrasonic welding device and a pressing means. The ultrasonic welding device acts, just like the pressing means, on the peripheral rim of the carrier ~~platelet~~plate 14, with the tapered edge 18 acting as an energy concentrator, with the result that a reliable load-bearing weld joint is produced at the bottom of the recess 12 between the brush body 10 and the ~~platelet~~plate 14.

[0020] The welding is effected with high precision so as to ensure a very precise fit of the ~~platelet~~plate 14 on the brush body 10.

[0021] But a small gap may still remain between the peripheral rim of the ~~platelet~~plate 14 and the surface of the brush body 10 surrounding the ~~platelet~~plate.

[0022] As is illustrated in Figure 3, this gap 20 may become wider by the bending load occurring when the toothbrush is in use.

[0023] This is prevented in the embodiment of the method as shown in Figure 4 by providing the ~~platelet~~plate 14 with an extension 14a which extends as far as into the neck region of the brush body. In order to make sure that this extension 14a is securely welded to the brush body 10, the extension 14a is likewise provided with a tapered edge 14b on its side facing the brush body, the edge 14b acting as an energy concentrator in ultrasonic welding.

[0024] In the embodiment shown in Figure 7, the recess 12 is provided with a stepped shape at its peripheral rim and the ~~platelet~~plate 14 is provided with a peripheral rim designed to match this shape.

[0025] In the embodiment as shown in Figure 8, a peripheral rim 14c is formed on the ~~platelet~~plate 14 which projects beyond the main body of the ~~platelet~~plate and has a tapered edge which rests on the surface of the brush body 10 surrounding the recess 12. In this embodiment an ultrasonic welding is also performed over the entire periphery of the ~~platelet~~plate 14.

[0026] In the embodiment of the method as shown in Figure 9, after the welding process the ~~platelet~~plate 14 has been pressed against the brush body 10 and has formed an intimate bond therewith over its entire periphery, so that no gap is produced at the junction between the ~~platelet~~plate 14 and the brush body 10.

[0027] In the embodiment as shown in Figure 10 the recess 12 has an oblique peripheral wall converging toward the inside of the brush body 10. The ~~platelet~~plate 14 has a peripheral wall of matching obliqueness, so that it is ensured that the ~~platelet~~plate 14 fits in the recess of the brush body with no gap in between. As in the embodiments shown above, the ~~platelet~~plate may in addition be provided with a tapered edge for the welding to the bottom of the recess 12.

[0028] As shown in Figures 11 and 12, any gap possibly left between the ~~platelet~~plate and the brush body may be closed by filling it with a ~~plastics~~plastic mass. It is particularly expedient to fill this gap with a ~~plastics~~plastic mass by injection molding in an injection mold. By selecting an elastomer as the ~~plastics~~plastic mass, the ~~platelet~~plate will be given an elastic support on the brush body from all sides which can be used to cushion vibrations occurring in use.

[0029] In all of the embodiments shown, the connection of the ~~platelet~~plate 14 with the

brush body 10 may alternatively or additionally be effected by means of an adhesive. The adhesive may also or additionally perform the function of filling any gap remaining between the ~~platelet~~plate and the brush body, thus removing the gap.



### Abstract

A method of producing brushes by connecting ~~platelets~~plates of a ~~plastics~~plastic material, having each tufts of brush bristles attached thereto and projecting from a first face, to an attachment surface portion of a brush body made of ~~plastics~~plastic, in particular the same ~~plastics~~plastic, by means of ultrasonic welding or ~~glueing~~gluing. Each of the ~~platelets~~plates has a peripheral rim facing the brush body and having an edge formed thereon which acts as an energy concentrator in ultrasonic welding.

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